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descriptive Catalogue greatly diminishes the usefulness of the Museum.

" We propose that the Catalogue be prepared in the following manner.

" The entire work to form an octavo volume, not exceeding twenty sheets, or 320 pages, to be illustrated by woodcuts, not exceeding 160 in number.

" The work to be divided into Fasciculi, each complete in itself, and comprising the description of a class of objects, such as the Gold Ornaments, the Weapons, &c.

" That the complete manuscript of each Fasciculus be submitted to the Committee of Publication before it is put to press.

" That George Petrie, LL. D., be requested to undertake the preparation of the Catalogue, subject to the foregoing conditions; and that a sum of 100 guineas be paid him as a remuneration for his labour; with permission to the Treasurer to pay him by instalments, on the completion of each Fasciculus, at the rate of five guineas per sheet; the balance to be handed to him on the completion of the whole work, provided that the whole work does not fall short of fifteen sheets.

" That the Committee of Publication be charged with the execution of this design, and that they be requested to confer with Dr. Petrie respecting the details of it."

RESOLVED,—That the Report of the Council be sanctioned, and adopted by the Academy; and that the sum of £105 be placed at the disposal of the Council, for the purpose stated in the Report.

The Rev. Samuel Haughton, Fellow of Trinity College, and Professor of Geology in the University of Dublin, communicated a short account of Experiments made by the Rev. Joseph A. Galbraith, Fellow of Trinity College, Mr. S. Wilfred Haughton, Mechanical Engineer, Superintendent of the Locomotive Department of the Dublin and Kingstown Railway, and himself, to determine the Azimuthal Motion of the Plane of Vibration of a freely suspended Pendulum.

"The experiments, of which the following is a brief account, were made at the engine-factory of the Dublin and Kingstown Railway Company, with different modes of suspension, upon a pendulum 35 feet 5 inches in length, the bob of which was of iron made spherical in a lathe, with a point turned true, projecting from its lower surface: its weight being 30lbs., and the pendulum being set in motion in the plane of the meridian. After some unsuccessful trials of various modes of suspension, we adopted one, which appears liable to less theoretical objection than any other we could undertake at a short notice. It consisted simply of a number of parallel fibres of hemp or cocoon silk, drawn tightly through a small hole in a thick metallic plate, at the upper surface of which the fibres were secured. This plate was then screwed down upon a metal surface, accurately planed and levelled, with a large circular aperture to allow the string of the pendulum to play freely. The silk or hemp fibres were continued for about ten inches below the under surface of the plate, and the remainder of the string of the pendulum was composed of copper or pianoforte steel wire. Underneath the point of suspension we placed a horizontal table furnished with graduated circles, round the common centre of which travelled a moveable arm, divided into tenths of an inch by parallel lines. We were enabled by this simple contrivance to read off the azimuth of the plane of vibration from the opposite sides of the circle, and at the same time to measure with precision the magnitude of the minor axis of the small elliptic vibration which accompanies the movement.

"In order to try the mode of suspension used by M. Foucault himself, we replaced the hemp fibres by a pianoforte wire drawn tightly through a hole carefully drilled in a thick steel plate, this being mounted as in the preceding experiments. Our observations were taken, during the earlier experiments, at intervals of five minutes, which we afterwards changed to ten minutes; and having thus determined the important points, we watched these continuously, using an interval of twenty minutes for the other portions of the motion.

" The two experiments with hemp fibres occupied a time exceeding sixteen hours each. The experiments with the wire suspension occupied periods of twenty hours each, and the experiments with the silk fibre suspension occupied fifteen and nineteen hours respectively. At the close of these periods the motion was distinctly visible, and being almost rectilinear, the direction of vibration could be determined with considerable accuracy.

" The results of these and subsequent experiments will shortly be offered to the Academy in detail; at present we shall confine ourselves to an abstract of those results, and to a brief comparison of the theory of M. Foucault with observation.

" The facts which we observed, without making any allowance for instrumental error, apsidal motion due to the difference between the arc of vibration and its sine, or disturbances produced by the air, may be expressed by the following statements, the initial motion being in the meridian:

" I. The azimuthal velocity diminished from the commencement of the motion, attaining a minimum in the position between E. 30° N. and E.

" II. The azimuthal velocity increased after it had passed the east, and attained a maximum, which appeared to lie between S. 40° E. and S.

" III. The motion of the azimuthal plane near the south and south-west appeared very unsteady, as if greatly affected by disturbing causes; but indicated a general tendency to increase its rate from S. to S.W.

" The azimuthal velocity derived from M. Foucault's theory is expressed by the following equation:

$$\frac{dA}{dt} = k \sin \lambda, \qquad (1)$$

in which A denotes the azimuth measured from the north towards the east; k the angular velocity of the earth, *i. e.* 15° per hour; and λ the latitude of the place of observation. This expression indicates a uniform angular velocity, and a time of revolution equal 24^h × cosec. of latitude, which for Dublin would be about $29^h\ 50^m$.

" The following Table, No. I., contains the mean results of the six experiments, giving the azimuth measured from N. to E., and the mean hourly motion, during the successive hours of observation:

TABLE I.

Hour.	Hourly Motion.	Azimuth.	No. of Experiments.
I.	12·86°	12·86°	6
II.	11·90	24·76	6
III.	11·61	36·37	6
IV.	11·50	47·87	5
V.	11·72	59·69	5
VI.	10·82	70·41	4
VII.	9·85	79·46	4
VIII.	10·77	90·23	4
IX.	13·00	103·30	6
X.	11·47	114·77	6
XI.	13·94	128·71	4
XII.	15·99	144·70	4
XIII.	14·32	159·02	4
XIV.	12·42	171·44	5
XV.	6·96	178·40	5
XVI.	16·97	195·37	4
XVII.	10·40	205·77	3
XVIII.	12·38	218·15	3
XIX.	11·01	229·16	3
XX.	12·15	241·31	2

" The next Table, No. II., contains the mean hourly motion and azimuth, calculated from the theory of M. Foucault.

TABLE II.

Hour.	M. Foucault.	
	Hourly Motion.	Azimuth.
I.	12°	12°
II.	"	24
III.	"	36
IV.	"	48
V.	"	60
VI.	"	72
VII.	"	84
VIII.	"	96
IX.	"	108
X.	"	120
XI.	"	132
XII.	"	144
XIII.	"	156
XIV.	"	168
XV.	"	180

" A comparison of Tables I. and II. shows that M. Foucault's azimuth appeared to fall short of observation during the first, second, and third hours; that it agreed with observation during the fourth and fifth hours; afterwards exceeded the observations, until, at a period occurring during the twelfth hour, it again coincided with the observed azimuth; became deficient again during the thirteenth, fourteenth, and fifteenth hours; and coincided with observation in the early portion of the sixteenth hour.

" If M. Foucault's azimuths be compared with the observed azimuths at the end of every three hours, the agreement will appear more close.

TABLE III.

Hour.	Calculated Azimuth.	Observed Azimuth.
III.	36·0°	36·37°
VI.	72·0	70·41
IX.	108·0	103·30
XII.	144·0	144·70
XV.	180·0	178·40
XVIII.	216·0	218·15

" A comparison of Table III. with Tables I. and II. would appear to indicate, that the variable part of the hourly motion is due to instrumental error.

" I may mention, in concluding this abstract, that in our sixth experiment, with silk fibre suspension, we obtained a complete revolution in azimuth of 360°. The time occupied in the revolution being 28^h 26^m."

[*Note added in the Press, May* 16, 1851.—" Before we commenced our experiments, and at the tine when the foregoing communication was made to the Academy, we had obtained a theoretical solution of the pendulum problem, founded on the supposition, as a first approximation, that the tension of the string of the pendulum was constant. The complete integrals obtained on this hypothesis, gave a value for the azimuth, which indicated a variable angular velocity of the plane of vibration. This solution of the problem we have since found to be erroneous, and therefore believe, that the variation in velocity which we have observed is due to instrumental error. The differential equations which we made use of, and which contain the complete solution of the problem are the following:

$$\begin{aligned} \frac{d^2x}{dt^2} &= -\frac{gx'}{r+l} + N\frac{(x'-x)}{l}; \\ \frac{d^2y}{dt^2} &= -\frac{gy'}{r+l} + N\frac{(y'-y)}{l}; \\ \frac{d^2z}{dt^2} &= -\frac{gz'}{r+l} + N\frac{(z'-z)}{l}. \end{aligned} \tag{2}$$

" In these equations the origin is the centre of the earth, the positive axis of z is the axis of rotation of the earth directed upwards; the positive axis of y is directed towards the spectator, and the positive axis of x to the right hand; x, y, z denote the co-ordinates of the centre of oscillation of the pendulum; x', y', z' the co-ordinates of the point of suspension; g is the attraction of the earth; l the length of the pendulum, and N is the tension of the string.

" If equations (2) be transformed to the point of suspension as origin, the positive axis of z being vertically downwards, the positive axes of x and y being in the horizon, and directed towards the east and north respectively, we shall obtain the following:

$$\begin{aligned} \frac{d^2x}{dt^2} + \frac{Nx}{l} &= 2k\sin\lambda\frac{dy}{dt} + 2k\cos\lambda\frac{dz}{dt} + k^2x; \qquad (3) \\ \frac{d^2y}{dt^2} + \frac{Ny}{l} &= -k^2r\cos\lambda\sin\lambda - 2k\sin\lambda\frac{dx}{dt} + k^2\sin\lambda(y\sin\lambda + z\cos\lambda); \\ \frac{d^2z}{dt^2} + \frac{Nz}{l} &= g - k^2r\cos^2\lambda - 2k\cos\lambda\frac{dx}{dt} + k^2\cos\lambda(y\sin\lambda + z\cos\lambda). \end{aligned}$$

" Or supposing the axes of co-ordinates transformed to the vertical and horizon of the actual spheroid, and supposing g to denote gravity, we find

$$\begin{aligned} \frac{d^2x}{dt^2} + N\frac{x}{l} &= 2k\sin\lambda\frac{dy}{dt} + 2k\cos\lambda\frac{dz}{dt} + k^2x; \\ \frac{d^2y}{dt^2} + N\frac{y}{l} &= -2k\sin\lambda\frac{dx}{dt} + k^2\sin\lambda(y\sin\lambda + z\cos\lambda); \\ \frac{d^2z}{dt^2} + N\frac{z}{l} &= g - 2k\cos\lambda\frac{dx}{dt} + k^2\cos\lambda(y\sin\lambda + z\cos\lambda). \end{aligned} \tag{4}$$

“ If the terms depending on k^2 be neglected in equations (4), we obtain

$$\begin{aligned} &\frac{d^2x}{dt^2} + N\frac{x}{l} = 2k \sin\lambda \frac{dy}{dt} + 2k \cos\lambda \frac{dz}{dt}; \\ &\frac{d^2y}{dt^2} + N\frac{y}{l} = -\, 2k \sin\lambda \frac{dx}{dt}; \qquad (5) \\ &\frac{d^2z}{dt^2} + N\frac{z}{l} = g - 2k \cos\lambda \frac{dx}{dt}. \end{aligned}$$

Eliminating N between the first two equations, we find

$$y\frac{d^2x}{dt^2} - x\frac{d^2y}{dt^2} = 2k \sin\lambda \left(y\frac{dy}{dt} + x\frac{dx}{dt}\right) + 2k \cos\lambda \, y\frac{dz}{dt}.$$

Integrating this equation, we obtain the following:

$$y\frac{dx}{dt} - x\frac{dy}{dt} = k \sin\lambda \, (x^2 + y^2) + 2k \cos\lambda \int y dz. \qquad (6)$$

Transforming (6) to polar co-ordinates, by the formulæ

$$\begin{aligned} x &= l \sin\phi \sin\theta, \\ y &= l \cos\phi \sin\theta, \\ z &= l \cos\theta, \end{aligned}$$

in which ϕ denotes the azimuth measured from the north, and θ the deviation of the pendulum from the vertical, we find

$$\frac{d\phi}{dt} = k \sin\lambda - \frac{2k \cos\lambda}{\sin^2\theta} \int \cos\phi \sin^2\theta d\theta. \qquad (7)$$

This equation proves, that the azimuthal velocity consists of two parts; one uniform, and equal $k \sin\lambda$, directed from the north to the east; the other periodic, and passing through all its changes in the time of an oscillation of the pendulum, and depending on the amplitude of the vibration. As the azimuth ϕ may be considered constant during the time of an oscillation, the second term in equation (7) may be integrated. Hence we obtain,

$$\frac{d\phi}{dt} = k \sin\lambda - \tfrac{2}{3}k \cos\lambda \cos\phi \,.\, \theta; \qquad (8)$$

θ being a small arc, the powers of which above the third may be neglected, and vanishing twice during each oscillation.

"From equation (8) it is easy to see, that the plane of oscillation undergoes a periodic variation in azimuth; in consequence of which the projection of the centre of oscillation of the pendulum on the horizon will describe a curve resembling a figure of eight, in which, if the pendulum be in the meridian, the motion in the northern loop is retrograde; and in the southern loop progressive.

"The variation in azimuth produced by the second term of equation (7) will be insensible, unless θ become nearly equal to π, in which case the change in azimuth will become indefinitely great; for, integrating (7), we find, the initial motion being in the meridian,

$$\frac{d\phi}{dt} = k \sin \lambda - k \cos \lambda \frac{\theta - \sin \theta \cos \theta}{\sin^2 \theta}. \qquad (9)$$

If in this equation θ be equal to π, the second term will be infinite and negative, denoting that the plane of vibration swings round suddenly to the west. This result is evident without analysis; for if the pendulum be started in the meridian, so as to pass the lowest point with a velocity due to twice its length, it will reach the top of the circle without velocity, and fall suddenly to the west, in the prime vertical.

"If the pendulum were to perform a complete revolution with a high velocity, the time of revolution in azimuth of the plane of its motion would tend to the limit $23^h\ 56^m$; but when the motion is oscillatory, the theoretical time of revolution in azimuth will $23^h\ 56^m \times \operatorname{cosec} \lambda$, as has been proved for small arcs of vibration by M. Binet. *Comptes Rendus de l'Acad. des Sciences*, Feb. 17, 1851)."]

Professor Allman read a notice of the emission of light by *Anurophorus fimetareus* Nicholi (*Leptura fimetarea*, Linn.) During a walk over the Hill of Howth, near Dublin, on a